

REMARKS:

Inventor Sundaram and Applicant's representatives thank the Examiner for the Office Action of August 18 and the interview of November 14. At the interview, Inventor Sundaram, Applicant's representatives and Examiner Alvo discussed Canadian Patent Application 2,078,276 (Canadian Application), U.S. Patent No. 5,346,588 (Sixta et al.), a proposed Declaration by Derek Hornsey, and proposed claim language.

The disclosed and claimed invention is directed to a process for bleaching pulp with ozone, including the following steps. A slurry of cellulosic pulp having a fiber consistency of from 1 to less than 5 weight % is prepared. Ozone is added to the cellulosic pulp in a contacting device to create a partial pressure [Pp] of O₃ greater than 1.4 psi. The ozone is reacted with the pulp in the contacting device under high shear mixing conditions. The ozone is maintained in contact with the pulp in the contacting device under the high shear mixing conditions for a time ranging from 0.01 - 1 second thereby consuming 87-99% of the ozone. The invention has the advantages of requiring relatively less energy and less time to bleach the pulp, thereby fully realizing the benefits of ozone bleaching of low consistency pulp. The invention also minimizes waste by utilizing a relatively greater proportion of the ozone.

In the Office Action, claims 1-24 were rejected. After amendment hereof, claims 1-25 are pending. Bracketed and underlined versions of all amended claims are attached hereto as Attachment A.

In the Office Action, Examiner Alvo rejected claims 1-2, 5-10, 13-21 and 23-24 under 35 U.S.C. 102(b) as anticipated or, in the alternative, under 35 U.S.C. 103(a) as obvious over the Canadian application. Examiner Alvo also rejected claims 1-2, 5-10, 13-21 and 23-24 under 35 U.S.C. 103(a) as obvious over the Canadian application in view of Sixta et al. Examiner Alvo further rejected claims 3-4 and 22 under 35 U.S.C. 103(a) as obvious over the Canadian application in view of Sixta et al. and U.S. Patent 5,583,536 (Hornsey et al.) or WO 93/15264 (the WO publication). Finally, Examiner Alvo further rejected claims 11-12 under 35 U.S.C. 103(a) as obvious over the Canadian application in view of Sixta et al. and U.S. Patent 5,690,786 (Cirucci et al.) or U.S. Patent 6,235,153 (Uchida et al.). Applicant respectfully asserts that these rejections should be withdrawn for several reasons.

In order to further clarify the claimed invention, Applicant's representatives have amended claim 1 to require 87-99% ozone consumption during an ozone contact time with the cellulosic pulp of 0.01-1 seconds under high shear mixing conditions. The inventors have unexpectedly discovered that when ozone is maintained in contact with low consistency pulp for the claimed time period under high shear mixing conditions, 87-99% of the ozone is consumed (lns. 2-7 of pg. 19 of the spec.). In contrast to the unexpected results yielded by the disclosed and claimed invention, Applicant respectfully asserts that the Canadian application, Sixta et al., and the remaining art of record fail to disclose, teach or suggest the claimed ozone consumption under high shear mixing conditions for the claimed time period, i.e., within 1 second or less.

To the extent that the Canadian application addresses a period of time in which ozone is consumed, it teaches contact of ozone with pulp in a retention tube for a period of 60-120 seconds, "in order to allow adequate time for reaction and thereby achieve efficient use of the ozone" (pg. 12, Ins. 27-36; pg. 26, Ins. 30-34). Based on this disclosure, it is believed that substantially all of the consumption of ozone occurs in the retention tube. Thus, it fails to disclose, teach or suggest the claimed ozone consumption under high shear mixing conditions, much less such consumption in the claimed time period.

To the extent that Sixta et al. addresses this same issue, it teaches mixing of pulp in a high shear mixer with ozone for a period of 15-120 seconds and with a reaction time of 120 seconds (col. 6, Ins. 63-64; col. 7, Ins. 24-25 and 57-58; col. 8, Ins. 17-18; col. 9, Ins. 31-32; col. 9, ln. 69 through col. 10, ln. 1; and col. 10, Ins. 62-63). Thus, it fails to disclose, teach or suggest the claimed ozone consumption in the claimed time period, much less such consumption under high shear mixing conditions.

With respect to the Canadian application, the Examiner takes the position that it teaches a high shear mixer for use with low consistency pulp. Applicant respectfully asserts that this position is not justified. While the Canadian application teaches a high shear mixer, it is silent as to which consistency pulp it is used with. Applicant submits that the disclosure of a high shear mixer is only associated with medium consistency pulp. In support of this position, Applicant has contemporaneously submitted a Declaration from Derek Hornsey, the first named inventor listed on the Canadian application. The Declaration establishes

the following findings. While the Canadian application teaches a high shear mixer, it is only mentioned in connection with medium consistency pulp. Over the past 30 years, the use of high shear mixers was not believed to be effective or efficient, and therefore was not considered by one skilled in the art. Rather, mixers for low consistency pulp were believed to involve a continuous stirred mixer (CST) due to the high volume of water in a low consistency pulp. Finally, the reference to high shear mixers in the Canadian application was intended for medium consistency pulp. For low consistency pulp, other conventional equipment instead would include the CST discussed above. Thus, Applicant has shown that one skilled in the art would likely have selected other than a high shear mixer for use with low consistency pulp.

The Examiner also takes the position that it would have been obvious for one skilled in the art to select the high shear mixer of the Canadian application for use with the 3-20% middle consistency pulp of Sixta et al. Applicant asserts that Sixta et al. teaches away from this hypothetical combination proposed by Examiner Alvo. Applicant believes that a skilled artisan would not look to the disclosure of Sixta et al. for a mixer when presented with the Canadian application, because while Sixta et al. discloses a middle consistency pulp of 3-20% solids, the Canadian application discloses a low consistency pulp of 0.5-3% solids. Examiner Alvo has not set forth any reasoning as to why a skilled artisan would select a mixer disclosed for use with one consistency range to mix pulp having a completely different consistency range. Indeed, it is believed that when

presented with the low consistency teaching of the Canadian application, one skilled in the art would have likely selected a CST as set forth above.

It is also submitted that Hornsey et al, the WO publication, Cirucci et al, and Uchida et al do not cure the deficiencies of the Canadian application and Sixta et al as discussed above. None of these documents in any manner disclose or suggest that one can consume 87+ % of ozone when contacting low consistency pulp under high shear conditions in a time period of less than 1 second, with a partial pressure of ozone greater than 1.4 psi.

Thus, Applicant believes that claims 1-25 are patentable over the Canadian application, Sixta et al., Hornsey et al., the WO publication, Cirucci et al. and Uchida et al.

Examiner Alvo further provisionally rejected claims 1-10 and 13-24 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-11 of copending Application Serial No. 09/559,993. Examiner Alvo further provisionally rejected claims 1-10 and 13-24 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-11 and 13-21 of copending Application Serial No. 09/559,993 in view of U.S. Patent 5,690,786 (Cirucci et al.) or U.S. Patent 6,235,153 (Uchida et al.). Applicant's representative is contemporaneously submitting a Terminal Disclaimer disclaiming any patent term of this application extending beyond that of Application Serial No. 10/201,248 [which is a continuation application of US Serial No. 09/559,993, now abandoned].

Finally, Applicant asserts that the art of record, alone or in combination, does not disclose, teach or suggest the claimed invention, including the claimed ozone consumption under high shear mixing conditions for the claimed time period. Therefore, Applicant believes the application is in condition for allowance and respectfully requests favorable consideration.

Should the Examiner believe that a telephone call or any supplemental Request for Reconsideration would expedite prosecution of the application, he is invited to call the undersigned attorney at the numbers listed below. An Information Disclosure Statement and a Terminal Disclaimer are being contemporaneously submitted with the associated fees. Otherwise, it is believed that no other fee is due at this time. If that belief is incorrect, please debit deposit account number 01-1375.

Respectfully submitted,



Christopher J. Cronin
Registration No. 46,513
Air Liquide
2700 Post Oak Blvd.
Suite 1800
Houston, TX 77056
(708) 579-7925 (708) 579-7801 (fax)



E. Joseph Gess
Registration No. 28,510
Burns, Doane, Swecker & Mathis
P.O. Box 1404
Alexandria, VA 22313-1404
(703) 836-6620 (703) 836-2021 (fax)

Date: December 12, 2002

ATTACHMENT A: UNDERLINED AND BRACKETED CLAIMS AS AMENDED

IN THE CLAIMS:

1. (Twice Amended) A process for bleaching pulp with ozone, which comprises the steps of:

preparing a slurry of cellulosic pulp having a fiber consistency of from 1 to less than 5 weight %;

adding ozone to the cellulosic pulp in a contacting device to create a partial pressure [Pp] of O₃ greater than 1.4 psi and reacting the ozone with the pulp in said contacting device under high shear mixing conditions; and

maintaining the ozone in contact with the pulp in the contacting device under the high shear mixing conditions for a time ranging from 0.01 to 1 second [to bleach the pulp] thereby consuming 87-99% of the ozone.